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funds. The social insurance authorities have had to close the children's sanatorium at Lichtenberg and dismiss the personnel, and the full utilization of the great sanatorium at Beelitz is threatened.

THE Henry Phipps Institute of the University of Pennsylvania has received a grant of \$25,000 a year from the Carnegie Corporation, and \$25,000 for two years from the university trustees. The conditions which must be met that advantage may be taken of the Carnegie grant are, first, the grant itself be expended for research, and second, there shall be previously expended for research not less than \$50,000 a year, derived from other sources, in any year in which this grant is claimed.

A CORRESPONDENT writes: "Dr. E. H. Sellards, geologist in the bureau of economic geology of the University of Texas, has been given leave from the University in order to undertake geologic investigations for the State of Texas in the Attorney General's Department relating to the Texas-Oklahoma boundary line on the Red River. The United States Supreme Court has held that the treaty of 1819 between the United States and Spain made the south bank of Red River the boundary between the two countries, and that by subsequent treaties and congressional acts this line as defined by the treaty with Spain has become the boundary line between Texas and Oklahoma on the Red River. However, there remain undetermined the questions: What constitutes the south bank of this river; where was the south bank approximately one hundred years ago when the treaty with Spain was made; and by what process has the river departed from its position of one hundred years ago, that is has the river moved gradually as by accretion to its banks, or suddenly as by ovulsion. The actual location of the boundary line between the two states for a distance of three hundred miles or more is contingent upon the Supreme Court's decision on these points to be made in accordance with the evidence that may be presented."

UNIVERSITY AND EDUCATIONAL NEWS

VASSAR COLLEGE receives \$150,000, and Barnard College, Yale University, the University of Rochester and Colgate College, \$10,000 each, by the will of the late Dr. Henry M. Sanders, formerly pastor of the Madison Avenue Baptist Church, of New York City.

DR. P. P. CLAXTON, recently United States commissioner of education, has accepted the provostship of the University of Alabama.

SECRETARY WEEKS, of the Department of War, has asked the University of Pennsylvania to release Major General Leonard Wood from his promise to become provost of the university in order that he may be free to accept the governor generalship of the Philippines.

As an *ad interim* measure, Dean Stanley Coulter has been appointed chairman of the faculty of Purdue University by the board of trustees and will administer all academic interests, while financial matters will be handled by a member of the board.

DR. CHARLES D. SNYDER has been appointed professor of experimental physiology in the Johns Hopkins University.

DR. JOHN C. DONALDSON has accepted appointment as assistant professor of anatomy in the school of medicine of the University of Pittsburgh.

DISCUSSION AND CORRESPONDENCE

ANOTHER HIGH-TEMPERATURE RECORD FOR GROWTH AND ENDURANCE

A TEMPERATURE record for growth and endurance of developing joints above that of any previously given was published by the senior author in SCIENCE for April 15, 1921. Young joints of *Opuntia* were found to continue elongation at 55° C. (131° F.) and to endure this temperature so that development was continued normally at lower and accustomed temperatures in March at the Desert Laboratory.

Measurements on other individuals with the advance of the season confirmed the earlier

results and have established a new high-temperature limit for active protoplasm in higher plants, also a new endurance record. The principal facts are as follows:

1. Joints of *Opuntia* were observed to maintain a fair rate of enlargement when at a temperature of 56.5°C ., the air surrounding them being at 58°C . (137°F .).

2. Growth of young joints of *Opuntia* the temperature of which rose to 62°C . (144°F .) in an air temperature of 63°C . (146°F .) stopped and some shrinkage ensued, but growth or enlargement was resumed when their temperature fell to 50°C .

3. The young joints which were subjected to these temperatures were about 15 to 20 mm. in width and 25 mm. in length, and after being held at or near the record temperatures for an hour or more, which was repeated in one case, carried forward normal development, reaching maturity at a normal average of 100 mm. in width and 130 mm. in length.

4. It is to be noted that data from observations in which temperatures were taken from the air or from water in which the roots or aerial parts of plants were immersed, have but little value in any estimation of the working temperature of active protoplasm by reason of the abnormal hydration and transpiration conditions introduced. These conditions as well as the proportions and state of the main colloidal components must determine the temperature effects.

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A CALCULATOR FOR CONVERTING GAS CHAIN VOLTAGE INTO EQUIVALENT $\text{C}_{\text{H}+}$ OR p_{H} VALUES

IN the determination of hydrogen-ion concentrations by electrometric methods employing the hydrogen electrode, the step of finding the $\text{C}_{\text{H}+}$ or p_{H} value from the measured voltage, with the aid of the working formula, though not difficult, is time-consuming. The extensive tables of Schmidt and Hoagland¹

simplify the process considerably. They give, in parallel columns, the voltages measured between a hydrogen electrode and a tenth-normal, and between the hydrogen electrode and a normal calomel electrode, respectively. With these are given the corresponding p_{H} , $\text{C}_{\text{H}+}$ and $\text{C}_{\text{OH}-}$ values, respectively. If the calomel electrode — because of difference in concentration of its potassium chloride solution, for example — has a different value, against the normal hydrogen electrode, from those assumed in these tables, a simple computation is necessary.

By definition, $\text{p}_{\text{H}} = -\log \text{C}_{\text{H}+}$, and the working equation, derived from Nernst's equation, shows these quantities to be linearly proportional to the measured voltage. If in all cases we had to deal with a single unvarying reference potential, the simplest procedure would be to draw the straight line, expressing the relationship, on a chart of rectangular coordinates, and to use this as the conversion chart. This plan, however, is not practicable in its application to all cases, because of the preferences of different workers for different types of reference electrodes.² Some prefer the tenth-normal, others the normal, still others the saturated type. In any given type, there are likely to be minor differences between different electrodes. To be able to apply the graphic chart to all cases requires that the straight line be capable of being shifted, parallel to itself at any one temperature, to correspond to the fundamental potential of the reference electrode being used.

Since it is a straight line relationship with which we are dealing, and since the variations mentioned do not change the slope of line, an instrument of the slide-rule pattern is not only feasible, but highly practicable. For convenience, the circular type was chosen. The $\text{C}_{\text{H}+}$ and p_{H} scales are engraved on a disk 125 mm. in diameter. From the relation between these two quantities, their main divisions coincide; e.g., for $\text{p}_{\text{H}} = 8$, $\text{C}_{\text{H}+} = 10^{-8}$.

² A graphic conversion chart of the kind mentioned is reproduced in "Electrometric Methods and Apparatus for Determining Hydrogen-ion Concentrations," L. & N. Co., 1920, p. 25.

¹ Univ. of Cal. Pub. in Physiol., 5, 23, 1919.